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Dimastigosporium yanense, a new coprophilous fungus from the forests of Western Ghats in Karnataka State, India

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Abstract — *Dimastigosporium yanense* sp. nov., isolated from cattle dung collected from the forests of Western Ghats, Karnataka State, India, is described and illustrated. *D. yanense* differs from the genus type species, *D. musimonum,* by the production of subcylindrical, smaller conidia with an apical and three basal appendages. The conidia develop holoblastically through one of the basal appendages.

Key words — biodiversity, anamorphic, coelomycete, pure culture.

Introduction

During studies on the biodiversity and taxonomy of microfungi of the forests of Western Ghats in southern India, an interesting coelomycete fungus was collected and isolated from partially decomposed cow dung. It was collected at Yana, a tiny hamlet amidst dense and pristine tropical forests, 30 km from Kumta, Uttara Kannada District, Karnataka State, India. Description and taxonomy of the fungus form the subject matter of this communication.

Materials and methods

The dung sample was air-dried and taken to the laboratory in paper bags. A small lump was soaked in sterile distilled water and incubated for several days in a sterile plastic box lined with moist filter paper. The dung was examined under a stereoscope at periodic intervals. Fungal fructifications appeared after 10 days of incubation. A pure culture of the fungus was established by streaking a sterile needle tip-full of conidia on malt extract agar (HiMedia, India) containing antibiotics (bacitracin, 0.02 g; neomycin, 0.02 g; penicillin, 0.02 g; streptomycin, 0.02 g; tetramycin, 0.02 g; dissolved in 10 ml of distilled water) and then purified by transferring germinated individual conidia onto malt extract agar slants.

Taxonomic description

Dimastigosporium yanense S.K. Yadav & Bhat, **sp. nov.** FIGURES 1–7

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Coloniae lente crescentes in agaro extracto malti, mucosae, pallide aurantiae, 3.5 mm diam. post 20 dies 22–24°C. Conidiomata primum clausa, deinde dehiscentia et cupularia, 250–450 µm diam., 500–750 µm alta, viridi-brunnea; stratum basilare pseudoparenchymatosum; paries pycnidiorum plectenchymatosus, setis conspicuis, rectis vel curvatis, crassitunicatis, laevibus, septatis, raro ramosis, usque 220 µm longis et 7 µm latis praeditus. Conidiophora in hymenio aggregated, hyalina, laevia, septata, in parte inferiore ramosa, 6–23 × 2–3.5 µm. Cellulae conidiogenae holoblasticae, cylindricae, sursum angustatae, laeves, integratae, determinatae, 6.5–20 × 1–5 µm. Conidia subcylindrica, hyalina, aseptata, solitaria, numerosa, aggregata pallide aurantia, tenuitunicata, laevia, 6.5–10 × 1.5–2.5 µm, una appendice apicali et tribus basilaribus praedita; appendices non-cellulares, hyalinae, non ramosae, laeves, 10–16 µm longae, ad 1 µm latae.

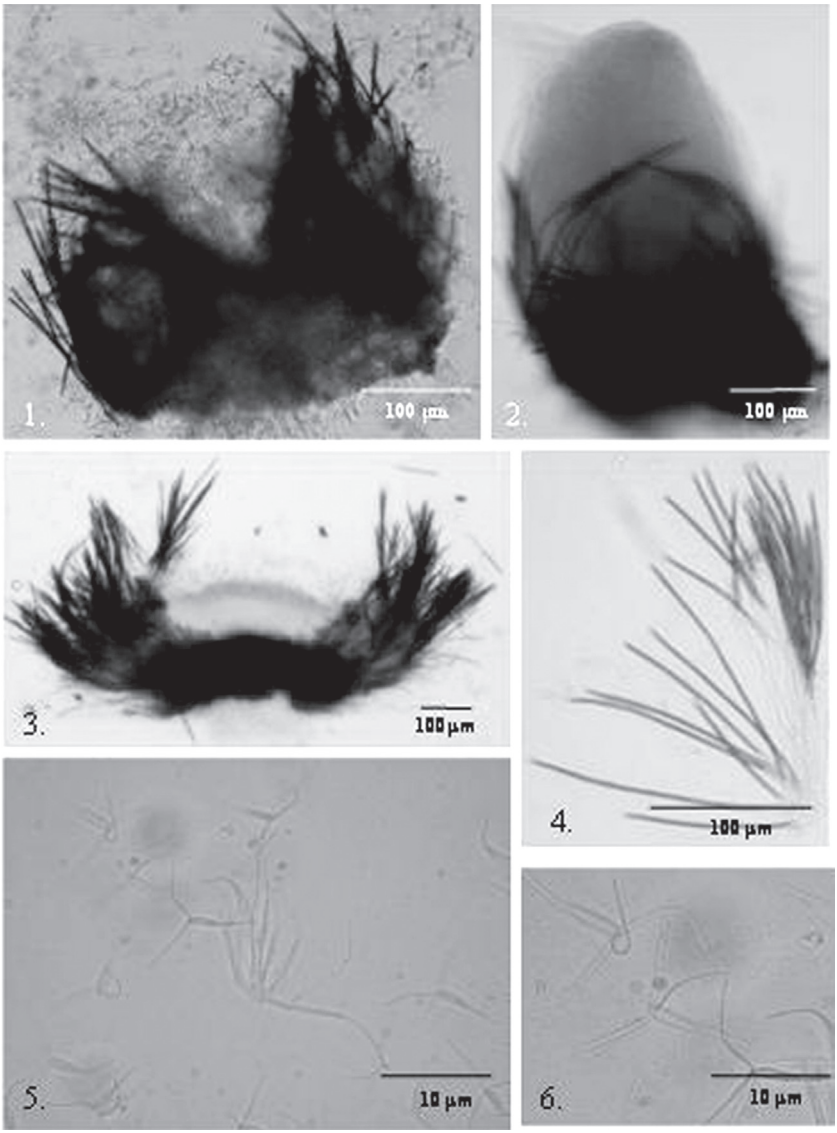
HOLOTYPE: On cattle dung, Yana, Karnataka, India, coll. Ashish Prabhugaonkar, 28.07.08. Herb. No. HCIO 48658

ETYMOLOGY: *yanense* = referring to the collection site.

Colonies slow growing on malt extract agar, slimy, pale orange, circular, 3.5 mm diam. after 20 days of incubation in diurnal light at 22–24°C. Conidiomata cupulate, initially closed, eventually opening, sessile, superficial, scattered, solitary, rarely in aggregates of 2–3, 250–450 µm diam., 500–750 µm high, greenish brown; basal tissue pseudoparenchymatous; conidiomal wall with discernible, straight or curved, thick-walled, smooth, septate, rarely branched, up to 220 µm long and up to 7 µm wide setae. Conidiophores developing in a hymenium, hyaline, smooth, septate, branched once or twice below mid point, 6–23 × 2–3.5 µm. Conidiogenous cells 6.5–20 × 1–5 µm, holoblastic, cylindrical, narrower at the tip, smooth, integrated, determinate, Conidia 6.5–10 × 1.5–2.5 µm, subcylindrical, hyaline, aseptate, solitary, numerous, pale orange in mass, thin-walled, smooth, with one appendage at apex and three at the base, developing through one of the basal appendages; appendages acellular, hyaline, unbranched, cylindrical, smooth, 10–16 µm long, up to 1 µm wide.

Discussion

The genus *Dimastigosporium* Faurel & Schotter, typified by *D. musimonum* Faurel & Schotter (Faurel & Schotter 1965, Nag Raj 1993), is characterized by superficial, cupulate conidiomata, smooth, branched, conidiophores, integrated, hyaline, cylindrical conidiogenous cells and appendaged conidia. Conidia in *D. musimonum* are hyaline, pyriform, 10–16 × 2.5–3 µm, with the primary appendage 16–23 µm long and 2–3 secondary appendages 12–21 µm long. *D. yanense* differs from the type species by smaller, subcylindrical, conidia (6.5–10 × 1.5–2.5 µm) with three basal and one apical appendage of 10–16 µm long. The two species are compared in TABLE 1.



Figures 1–6 *Dimastigosporium yanense.* 1–2. Conidiomata; 3. Section through a conidioma; 4. Setiferous hyphae; 5. Conidiogenous cells; 6. Conidia

Sutton (1980: 470), in describing the genus *Dimastigosporium,* wrote: "… during conidiogenesis the body of the conidium is formed first and is attached to the conidiogenous cell by one of the appendages." Nag Raj (1993), in examining

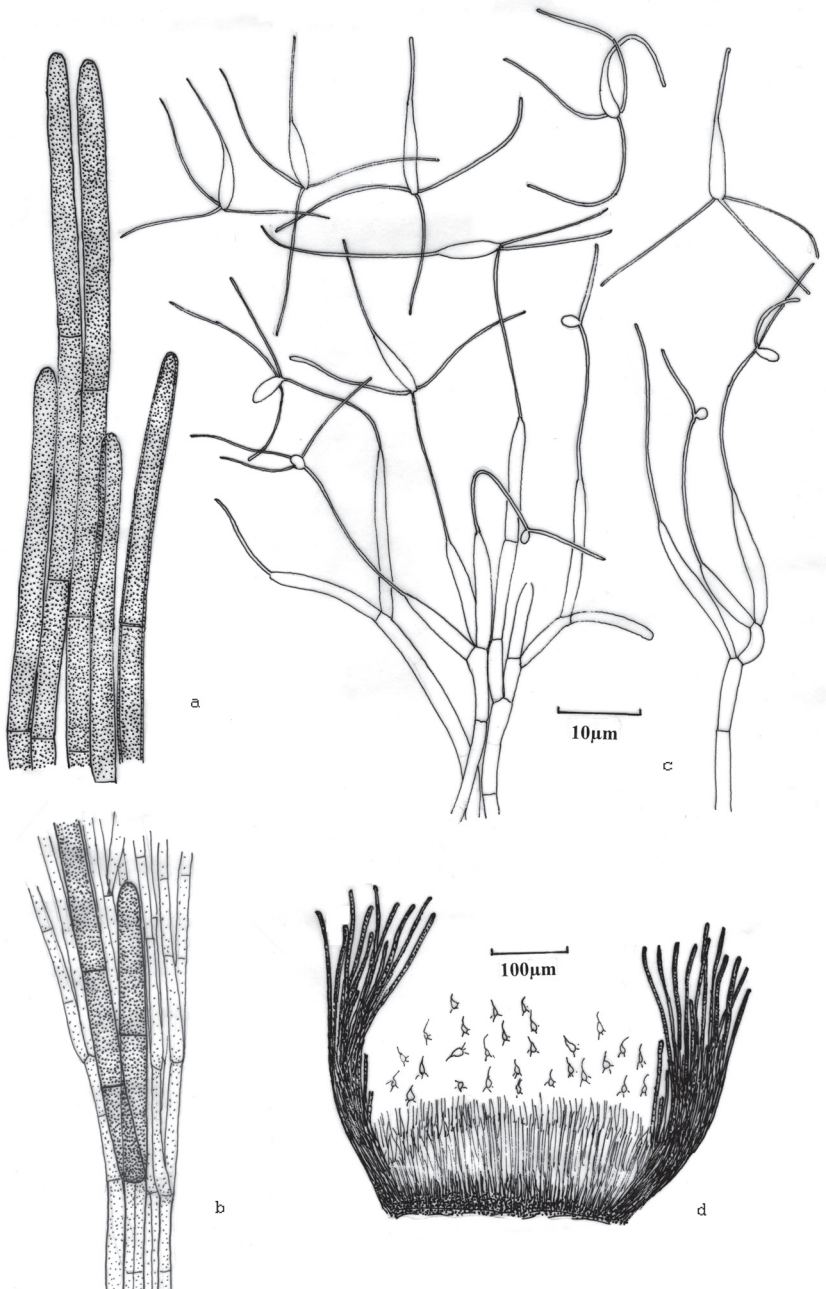

a
10µm
c
b
100µm
d

Table 1: Comparison of *D. musimonum* with *D. yanense*

Characters	*D. musimonum*	*D. yanense*
Habit & habitat	Wild sheep (*Ammotragus lervia*) dung	Cow (*Bos taurus*) dung
Conidiomata	Superficial, cupulate, black or blackish green, 350 µm diam., ≤ 200 µm high	Superficial, cupulate, greenish brown, 250–450 µm diam., 500–750 µm high
Conidiomal wall type	Pseudoparenchymatous	Textura porrecta
Conidiophores	Cylindrical, septate, sparingly branched at the base, smooth, hyaline.	Septate, branched below mid point, hyaline, smooth, 6–23 × 2–3.5 µm
Conidiogenous cells	Holoblastic, integrated, subcylindrical to obclavate, hyaline, 11–15 × 1.5–2 µm	Holoblastic, integrated, cylindrical, narrower at the tip, hyaline, 6.5–20 × 1–5 µm
Conidia	Pyriform, unicellular, hyaline, thin-walled, smooth, 10–16 × 2.5–3 µm	Subcylindrical, unicellular, hyaline, smooth, rounded at the base, 6.5–10 × 1.5–2.5 µm
Conidial appendages	Primary appendage 16–23 µm long, 2–3 secondary appendages 12–21 µm	Four; one at the tip, 3 at the base, 10–16 µm long, ≤ 1 µm wide.

the only slide available in the voucher material of *D. musimonum,* could not diagnose the exact nature of conidiogenesis, although he suspected it to belong to the phialidic category. Careful examination of the conidiogenesis in *D. yanense* revealed that conidium ontogeny is holoblastic and the body of the conidium is developed through one of the basal appendages (Fig. 7c).

Coelomycetous genera such as *Eleutheromyces* Fuckel, *Monodia* Breton & Faurel and *Strasseria* Bres. & Sacc. (Nag Raj 1993, Sutton 1980) also exhibit similar conidial development wherein conidiogenesis is initiated through an appendage within a compact ostiolate pycnidium. The conidia develop at the tip of filiform appendages emerging from the conidiogenous cells. In *Eleutheromyces* and *Strasseria*, typified by *E. subulatus* (Fuckel 1870) and *S. carpophila* (Strasser 1902), respectively, the conidia are enteroblastic and phialidic whereas in *Monodia* they are holoblastic. With holoblastic conidiogenesis, appendaged conidia and coprophilous habitat, *Dimastigosporium* is more similar to *Monodia*, typified by *M. elegans* (Breton & Faurel 1970), though the former

Figure 7. *Dimastigosporium yanense*. a–b, Setiferous hyphae; c, Conidiogenous cells & Conidia; d, Section of a conidioma.

Table 2. Comparison of *Eleutheromyces, Dimastigosporium, Monodia* and *Strasseria*

Characters	*Eleutheromyces*	*Dimastigosporium*	*Monodia*	*Strasseria*
Habit and habitat	On *Polyporus picipes* and hymenomycetes	Cow (*Bos taurus*) dung	Herbivorous animal dung	On trees (*Picea excelsa*, *Pinus strobus*, *P. nigra*)
Conidiomata	Pycnidial, gregarious, unilocular, ostiolate, pale brown, 130–350 µm diam. ≤ 3300 µm high	Superficial, cupulate, black or blackish green, 350 µm diam., ≤ 200 µm high	Pyriform, (semi)immersed, ostiolate, dark brown, 240–350 µm diam.	Pyriform, immersed, ostiolate, black to dark brown, 100–350 µm diam.
Conidiomata wall type	Textura angularis	Pseudoparenchymatous	Textura angularis	Textura angularis
Conidiophores	Cylindrical, septate, branched at base, hyaline, smooth, 60 × 2.5–3.5 µm	Cylindrical, septate, sparingly branched at the base, hyaline, smooth, size unknown	Septate, branched, hyaline, smooth, 70 µm long	Cylindrical to lageniform, septate, branched, hyaline, 6–14 × 2–2.5 µm
Conidiogenous cells	Enteroblastic, phialidic, integrated, determinate	Holoblastic, integrated, subcylindrical to obclavate, hyaline, 11–15 × 1.5–2 µm	Holoblastic, integrated, terminal, 8–18 × 1–3 µm	Enteroblastic, phialidic
Conidia	Lenticulate, unicellular, hyaline, 4–5.5 × 1.5–2 µm	Pyriform, unicellular, hyaline, thin-walled, smooth, 10–16 × 2.5–3 µm	Subcylindrical, unicellular, smooth-walled, base truncated 16–24 × 5.5–7 µm	Botuliform, unicellular, hyaline, smooth, 8–15 × 2–3 µm
Conidial appendages	Unbranched, cellular, smooth, thin-walled, eguttulate, 2–7 µm long	Primary appendage 16–23 µm long, 2–3 secondary appendages 12–21 µm	Four filiform, two at either end, unequal in length, 16–23 µm long	One filiform, flexuous, smooth, unbranched, 12–15 µm long

is distinct by absence of discernible pycnidium. In *Dimastigosporium* species, the fructification is a closed structure to begin with; it later attains an open, cupulate shape. The salient features of these genera are summarized in Table 2.

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